Space Weather Forecast

Issued on Sunday 23 March 2025 at 00:13 Local

This forecast provides a four-day assessment of space weather events. The probabilities stated below are for reaching or exceeding the given levels. For more information about space weather impacts please see the Met Office Space Weather Scales https://www.metoffice.gov.uk/weather/learn-about/space-weather/uk-scales

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Space Weather Forecast Headline: Chance of Minor-Moderate Radio blackouts. Minor to Moderate Geomagnetic storms possible each day. Chance of Strong Geomagnetic storm day 1 (23 Mar).

Analysis of Space Weather Activity over past 24 hours

Solar Activity: Solar activity has been Low in the past 24 hours, with occasional C-flares. There are currently thirteen sunspots on the Earth facing disc. Despite the large amount of sunspots, the vast majority are relatively small and magnetically simple and either stable or in slight decay. The most significant group is located in the northwest quadrant, and has exhibited quite rapid growth in the past 24 hours, with multiple penumbra having developed in its trailing portion.

A faint but quite wide angle CME was observed leaving the sun following a filament lift-off from just south and east of centre disc, between 22/1300-1500 UTC. This is being analysed for any potential Earth-directed component. No other Earth-directed CMEs were observed in available imagery.

Solar Wind / Geomagnetic Activity: Solar winds were indicative of CME and coronal hole influences. Peak elevated speeds of 520-525km/s were observed around 22/0100 UTC and 22/1900 UTC, with an erratic reduction to slightly elevated levels 430-480km/s in-between. Interplanetary Magnetic Field (IMF) was initially strong but very gradually declined to current weak levels. The north-south component, Bz, followed a similar pattern to the IMF, with early peaks of moderate positive (north) and strong negative (south) orientation, before gradually easing and remaining largely negative. Geomagnetic activity was G1-G2/Minor-Moderate storm (Kp 5 to 6) between 22/0000-0600UTC. A brief reduction to Quiet (Kp 1) followed 22/0600-0900 UTC, with Active or Unsettled (Kp 3 to 4) levels thereafter.

Energetic Particles / Solar Radiation: The count rate of energetic particles (high energy protons) was at background levels with no solar radiation storms observed.

Four-Day Space Weather Forecast Summary

Solar Activity: Generally Low activity is expected, with a chance of further isolated M-class flares.

Solar Wind / Geomagnetic Activity: Two CMEs (coronal mass ejections) feature in the forecast, with a chance of further weak transients. One coronal mass ejection from 19 Mar may yet still give

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a glancing blow at Earth at first on day 1 (23 Mar). The second was a faint halo coronal mass ejection which is likely to arrive during the the first half of day 1 (23 Mar).

Otherwise, solar winds are expected to continue slightly elevated to elevated initially due to coronal hole influence, but are likely to become enhanced further with the CME arrival, perhaps reaching strong levels. Solar winds should then gradually decline through 24 and 25 Mar, before the potential arrival of the faster stream of solar wind from the next coronal hole, from late 25 into 26 Mar.

Unsettled to Active geomagnetic conditions are likely initially, before rising to G1/Minor to G3/Strong storming due to likely combined coronal hole and CME influences through day 1 (23 Mar). Geomagnetic activity is then expected to reduce back to Unsettled to Active, with a chance of G1-G2/Minor to Moderate Storms days 2 to 4 (Mar 24 to 26) initially from residual CME effects, then latterly from the next coronal hole connection.

Energetic Particles / Solar Radiation: The count rate of energetic particles (high energy protons) is expected to persist at background levels, with a slight chance of enhancement from any larger flares.

Geomagnetic Storms

Geomagnetic Storm Probability (Exceedance)	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Minor or Moderate	**G1 to G2**	Yes	90	50	40	60
Strong	**G3**	No	50	5	5	10
Severe	**G4**	No	20	1	1	1
Extreme	**G5**	No	2	1	1	1

Radio Blackouts - X-Ray Flares

X-Ray Flares Probability	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	**R1-R2 (M Class)**	No	35	35	35	35
Very Active	**R3-R5 (X Class)**	No	1	1	1	1

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Solar Radiation Storms (High Energy Protons)

Radiation Storms Probability (Exceedance)	Level ($cm^{-2}sr^{-1}s^{-1}$)	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	**≥ S1**	No	5	5	5	5
Very Active	**≥ S3 ***	No	1	1	1	1
* S3 ≥ 10 MeV ≥ 1000 pfu and/or 50 MeV ≥ 10pfu. (pfu = $cm^{-2}sr^{-1}s^{-1}$)						

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